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Original article

# Media and social impact valuation of a living wall: The case study of the Sagrado Corazon hospital in Seville (Spain)

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ABSTRACT

Vertical greening systems have increased in popularity during the last years due to their experienced added ecological and aesthetic value for current clients. The use of living walls is in line with a service sector focusing on environmental consciousness. Still, scientific evidence is lacking regarding the multiple benefits of LW. There is also a lingering fear of high installation and maintenance costs. Therefore, it is important to assess the intangible benefits that increase the value of living walls and, hence, of the place in which they are installed. The main objective of this work is the valuation of the returns obtained because of the publicity related to a living wall installed in the 'Quirónsalud Sagrado Corazón' Hospital in Seville (Spain) and the assessment of the public's perception towards it. The investment that the hospital would have made in order to obtain a similar media impact has been estimated. The living wall proved to be very profitable in terms of publicity as the installation costs were recovered six times over. Also, the attitude towards the presence of such a greening system in the premises was assessed. To do so, 555 questionnaires were handed out face-to-face to patients, visitors and workers present at the hospital. Most participants concurred that the living wall induced positive reactions and improved their psychological well-being. Therefore, they completely agreed with the investment made by the hospital on such a vertical greening system.

## 1. Introduction

Many cities are currently facing several problems related to a high construction density and lack of green spaces. For this reason, unconventional urban greening methods such as green roofs and vertical greening systems are being implemented. The use of living walls (LW) is becoming popular, even indoors, as a way of introducing plants into the built environment. However, in many cases, an LW is not installed because of the expenditure it involves, especially regarding installation and maintenance costs. For this reason, it is important to take into account the advantages of these technologies, several of which involve an economic gain that contributes to recovering the investment. In some cases, non-economic characteristics such as aesthetics and environmental protection are key motivators (Balram and Dragićević, 2005) which incentivise LW installations. In the service sector, users or clients are more environmentally conscious, so these systems can provide an added ecological value that is highly appreciated. Also, some authors point to an increase of the property value when there are green areas around (Bengochea Morancho, 2003; Czembrowski and Kronenberg, 2016; Netusil et al., 2014). In the case of an LW, these increments have been estimated at between 2 and 5% (Perini and Rosasco, 2013). Of course, these figures are inconclusive as they depend on multiple variables (characteristics of the building, location, type and dimensions of the LW, etc.).

Over the last years, the scientific community has been researching about the multiple ecological and environmental benefits associated with LWs, such as enriching urban biodiversity, improving air quality or enhancing building thermal performance (Pérez-Urrestarazu et al., 2015). Sometimes, the effect of an LW can be measured directly or determined using models. For example, noise attenuation or indoor temperature modulation due to an LW can be empirically tested. Therefore, there are some studies that quantify those benefits in terms of economic impact (e.g., energy savings). But in other cases, people benefit from an environmental amenity without consciously using it (Tomalty and Komorowski, 2010). This indirect use value is considered as a soft or intangible benefit, not directly tradable and quite difficult to quantify (e.g., users' positive feelings towards a 'greener' space or marketing benefits related with the public's interest in environmentally friendly products and sustainability). As an example, Tomalty and Komorowski (2010) quantified the economic value of different green

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roof case studies. For each benefit considered they used a different method to make the estimations. For instance, the value of the publicity gained as a direct consequence of green roof investments was assessed as a marketing benefit. The Noise Sensitivity Depreciation Index (NSDI) (Andersson et al., 2013) was used to estimate the financial gain due to sound attenuation. Stormwater retention was valued considering the cost of regular stormwater retention infrastructure required to have the same effect as the green roofs studied. Yang et al. (2008) calculated the economic benefit linked with the pollutant removal capacity of a green roof.

Economic science has developed specific methods to estimate the value of environmental assets in monetary units (Bengochea Morancho, 2003; Tomalty and Komorowski, 2010). In 'Stated preference' techniques, such as contingent valuation, the economic value is attributed by asking people their Willingness To Pay (WTP) for certain services or benefits provided by green infrastructure (Bengochea Morancho, 2003; de Groot et al., 2002; Jim and Chen, 2006; Tomalty and Komorowski, 2010). This WTP can be related to how people perceive and interact with the green infrastructure, and their self-reported well-being and preferences (Dallimer et al., 2014; Mell et al., 2013). There are several studies using contingent valuation to establish the economic value of green infrastructure (Breffle et al., 1998; Dallimer et al., 2014; Jim and Chen, 2006; Mell et al., 2016, 2013). Most of them are related to conventional green infrastructures, mainly parks and open areas. There are some experiences with green roofs (Bianchini and Hewage, 2012; Clark et al., 2008; Claus and Rousseau, 2012; Tomalty and Komorowski, 2010), but an absence of them in LWs.

Part of the value attributed to vegetated environments lies in their positive effect on health and well-being, providing relief from the pressures of high-density living. Even a passive involvement with nature, relying on the visual amenity, can bring about considerable psychological benefit (Özgüner and Kendle, 2006; Ulrich, 1984). Buildings with certain types of integrated vegetation seem to be more liked, aesthetically pleasing, and restorative than those without vegetation (White and Gatersleben, 2011). As viewing nature has been reported to relieve stress and pain, it makes it an ideal medium for use in healthcare settings (Vincent et al., 2010). Particularly, in the case of hospital confinement, some patients see their access to outdoor environments almost entirely limited to views through windows. Patients in hospital rooms with plants and flowers or even with access to a vegetated sight had significantly shorter hospitalisations, fewer intakes of analgesics, lower ratings of pain, anxiety and fatigue, more positive feelings and higher satisfaction (Bringslimark et al., 2009; Park et al., 2004; Park and Mattson, 2009, 2008; Ulrich, 1984). These findings emphasise the therapeutic value of plants in the hospital environment.

Citizens generally have a positive attitude towards green infrastructure elements and these reactions are related with their support for them (Jungels et al., 2013). Environmental satisfaction is affected by many factors, such as gender or age, but also depends on the characteristics of the green spaces (type of vegetation, colours, smells) (Qin et al., 2013), so it is important to assess people's response to their interaction with nature. Measuring individual stances towards urban green spaces has received sparse coverage in the environment and planning literature (Balram and Dragićević, 2005). Some studies are available involving positions regarding urban green spaces (Balram and Dragićević, 2005; Carrus et al., 2015; Jim and Chen, 2006; Mell et al., 2013), but few of them involve green roofs or green façades (Fernandez-Cañero et al., 2013; Jungels et al., 2013; Rahman et al., 2015; White and Gatersleben, 2011 Yuen and Nyuk Hien, 2005) and only Wong et al. (2010) referred to vertical greening systems in general.

The main objective of this work is the valuation of the effect of an LW installed in a hospital in Seville (Spain) in terms of its impact in the media and on people. The media repercussion due to the LW was evaluated considering it as a marketing investment. On the other hand, the influence of the LW on the hospital personnel and users and their point of view concerning the presence of vegetation (specially the LW) were assessed by means of a survey in order to estimate the benefit obtained from it. The first working hypothesis is that the LW in the hospital had a monetary return in marketing making its installation worthwhile. The second involves the belief that the LW positively influenced the hospital personnel, visitors and patients, who agreed with the investment made by the medical centre.

## 2. Methods

### 2.1. The hospital and the living wall

Quirónsalud Sagrado Corazón Hospital (QSCH) is part of Quirónsalud, a Spanish hospital group made up of several private hospitals. In 2015, QSCH received around 138,000 patients and had 575 workers. Apart from the main hospital building, QSCH has three medical centres in different locations in Seville (Spain). In 2012, the main building was remodelled and an LW was installed outdoors in August 2012 on an external façade facing the main hall of the hospital. The LW has an approximate area of 40 $m^2$ (17 m long by 2.2 m high). In its design, inspired by Burle Marx' "Suspended Garden", around 1400 plants of 40 different species were used. For the LW installation, a felt system, composed of 1 × 1 modules with pockets in which the plant rootballs are inserted, was used. The LW can be viewed from the main hall through a large window (Fig. 1) and from some of the rooms for patients.

### 2.2. Media impact assessment

All the QSCH media appearances due to the LW were identified from its installation until the end of 2015 in order to calculate the return on investment of the LW in terms of media impact. The comparable cost methodology (Tomalty and Komorowski, 2010) was used as a way of estimating the marketing benefits of green infrastructure by assessing the value of the free publicity received as a direct consequence of the LW's presence. To do so, the real cost these media appearances would have entailed has been calculated. Those costs are broken down into the ad production charge (not taken into account in this study), plus the cost of running the advertisement. A slightly different process was adopted for each medium considering several factors. For radio and television, the aspects influencing the cost were the channel/radio station, duration of the interview/report (including only the minutes talking about the hospital's LW), air time and audience. In the case of the written press, the process was more complex and the information on the estimated cost of each published article was provided by a specialised company (Acceso Group S.L.) which made an internal report for the hospital. Only the articles about the LW were taken into account. The variables involved to make the estimation were the newspaper in which the article was published, the total of copies distributed, section, number of pages, area covered by the article and% of the page occupied by it (page coverage), position on the page, the average number of readers and the author of the article. Finally, the advertising rates in each channel, station or newspaper were considered according to the factors previously described. For the digital press, the parameters usually employed are the number of visits and the CPM or cost per thousand impressions (Kumar and Sethi, 2009), where an impression can be defined as the display of an ad while a user is viewing a web page. However, the number of visits refers to the digital newspaper and not to a certain article, so the estimation using this number is not accurate. Therefore, the impact on the digital press was finally excluded from the study. Also, appearances in internet social networks, as well as in blogs, were not taken into account due to the difficulty of estimating the number of viewings or the value of a 'like' or a 'share'.